

## DOCUMENT RESUME

ED 190 511

SP 016 358

TITLE Tests and Measurements Research Project for the Canadian National Baseball Team: Cooperative Change Agent Research by Baseball Canada and SIR/CAR.

INSTITUTION Windsor Univ. (Ontario). Faculty of Physical and Health Education.

PUB DATE 79

NOTE 11p.: Paper presented at the Annual Meeting of the Canadian Association for Health, Physical Education and Recreation, Evaluation, Sociology and Philosophy (St. John's, Newfoundland).

EDRS PRICE MF01/PC01 Plus Postage.

DESCRIPTORS \*Athletes: Baseball: Behavior Patterns: \*Biomechanics: \*Exercise Physiology: Performance Factors: \*Psychological Characteristics: Research Methodology: Self Concept: \*Sociology: \*Testing: Training Methods

## ABSTRACT

Results are reported of a research effort designed to provide a comprehensive profile of the characteristics of members of the Canadian National Baseball Team. The subjects of the study were candidates for the team. The control group consisted of top level amateur baseball players from Windsor. Four examinations were made: 1) physiological tests for maximum oxygen uptake and skinfold measures; 2) biomechanical laboratory tests for static strength and field test on time, distance, and velocity factors; 3) psychological tests; and 4) the organization and administration of the team. The ultimate goal of this research is to develop a conceptual and mathematical model involving the most relevant tests in the selection and development of elite national baseball players. (JD)

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TESTS AND MEASUREMENTS RESEARCH PROJECT FOR THE CANADIAN NATIONAL BASEBALL TEAM:

COOPERATIVE CHANGE AGENT RESEARCH BY BASEBALL CANADA AND SIR/CAR\*

by

University of Windsor  
Sport Institute for Research/  
Change Agent Research (SIR/CAR)

Organization and Administration - Dick Moriarty and Brian Walters

Biomechanics - Wayne Marino and Pierre Gervais

Physiology - Paul Taylor and Bruce & Donna Young

Social/Psychological - Greg Reeds and Ken Tyler

Computer Analysis - John Zarebski and Jennifer Pace

Presentation to the Annual Meeting of the Canadian Association for  
Health, Physical Education and Recreation, Evaluation, Sociology and  
Philosophy - St. John's, Newfoundland

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TESTS AND MEASUREMENTS RESEARCH PROJECT FOR THE CANADIAN NATIONAL BASEBALL TEAM;  
COOPERATIVE CHANGE AGENT RESEARCH BY BASEBALL CANADA AND SIR/CAR

by University of Windsor SIR/CAR\*

This presentation reports the results of a research project conducted by the University of Windsor Sports Institute for Research through Change Agent Research (SIR/CAR) on a grant received from the Fitness and Amateur Sport Branch. The study entitled "Tests and Measurements Research Project for the Canadian National Baseball Team: Cooperative Change Agent Research by Baseball Canada and SIR/CAR" was conducted from June 13 to June 27, 1979 in conjunction with the first annual selection and training camp for the Canadian National Baseball Team.

This research project brought together the managers and coaches of the Canadian National Baseball Team and some members of SIR/CAR to work cooperatively during the course of the baseball training camp to test and analyze the physiological, biomechanical, psychological and sociological makeup of the Canadian National Baseball Team. In addition, the effectiveness and efficiency of the team, as a unit was analyzed by the principles of management science.

Research Protocol and Format for Report of the Study

This slide presentation and videotapes which are available document the research protocol and depict the battery of tests which were administered by SIR/CAR to the candidates for the National Baseball Team. Initially, the coaches and candidates were greeted by the Director of SIR/CAR and welcomed to the University of Windsor. The message conveyed was something along the lines of that listed below:

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\* SIR/CAR is the registered trademark for the University of Windsor Sports Institute for Research/Change Agent Research which is housed in the University of Windsor Faculty of Human Kinetics. This research study was conducted on a grant from the Fitness and Amateur Sport Branch.

Welcome to Windsor and the University of Windsor. Through the efforts of your Executive Director, Paul Lavigne, and your Technical Director and Manager, Bill MacKenzie, the Canadian Federation of Amateur Baseball is hosting this year's first national training camp. Through the cooperative efforts of these gentlemen and Mr. Ron Steele the training camp is located here in Windsor, Ontario. You couldn't find a city in Canada where you would be more welcome or where you would find more enthusiasm for baseball. Windsor is a great baseball city, as is our neighbour north of the border, Detroit. We are very pleased to have you in the University of Windsor residence, utilizing the cafeteria and practicing daily at Mic Mac Park, which is adjacent to our campus. Make yourselves at home in the residence, enjoy the cafeteria, and we invite you to make use of the Human Kinetics building dressing rooms and training facilities. Above and beyond this, we are pleased to make the University of Windsor scientific facilities and capabilities available to you.

The faculty and students at the University of Windsor in cooperation with the Canadian Federation of Amateur Baseball are conducting a battery of tests aimed at a more valid, reliable and objective selection and training of members for the national team. The results will be made available to the candidates for the team as well as the coaches.

The experimental group for the study is made up of candidates for the Canadian National Baseball Team. The control group consists of top level amateur baseball players from Windsor.

Four areas are being tested, namely: 1) physiological tests for maximum oxygen uptake and skinfold measures; 2) biomechanical laboratory tests for static strength and field test on time, distance and velocity factors; 3) psychological tests in the form of psychological research forms, the Illinois trait-anxiety, self-evaluation state anxiety, imbedded figures and the coaches inventory; and 4) indepth audio interview on organization and administration in baseball. Media monitoring and personal observation of interactions involved in the selection and training of the national team will be conducted.

It should be stressed that the results will be shared with the players and with the coaching staff. Anyone who is uncomfortable with any phase of the testing is urged to opt out at any time. The Human Ethics Standards of Canada Council require that those involved in research projects have informed consent. Windsor supports the standards and, therefore, I have outlined the nature and disposition of this research study. Throughout the course of the study the results will be fed back to those involved in this project and, ultimately, the results will be written up and provided to the Canadian Federation of Amateur Baseball.

The research task force for this project consisted of the management and coaching staff of Baseball Canada and representatives of SIR/CAR listed below, each of whom, in cooperation with research assistants, were responsible for the areas indicated:

1. Dr. Paul Taylor: applied physiological assessment, including:
  - a) oxygen consumption and energy production. Each player was evaluated for his capacity to maximally consume oxygen and produce energy for athletic performance.
  - b) body composition and the determination of optimal performance body weight. A combination of anthropometric measurements and skinfold assessments were used to predict the ideal body weight for performance.
2. Dr. Wayne Marino: biomechanics and photographic analysis.
  - a) general tests were made for
    - i) static strength assessment
    - ii) ninety foot time trials
    - iii) maximum velocity tests.
  - b) specific tests included:
    - i) bat velocity
    - ii) time to leave the batter's box following a hit  
(analysis of different styles of dropping the bat)
    - iii) specific information of interest to the coach, including time, distance and velocity factors.
    - iv) effectiveness of walking, crossover or power starts during a steal

3. Mr. Ken Tyler and Greg Reeds: social psychology

Paper and pencil tests were conducted to assess:

- a) general athletic psychological profile
- b) specific measurements such as
  - i) personality evaluation
  - ii) self-concept evaluation
  - iii) anxiety inventory (game vs practice situations, i.e., competitive anxiety evaluation)
  - iv) coach's cooperative goal-setting behaviour.

4. Dr. Dick Moriarty: organization and administration

Audio interview, written opinionnaire and personal observation were utilized to assist management and team members to identify immediate, intermediate and long-range goals and brainstorming on the most effective and efficient means to achieve these goals. Included in this analysis were:

- a) an indepth taped audio interview with each player and member of management
- b) a brief written opinionnaire based on the audio interviews
- c) personal observation of team members and management during team activities on and off the field by personal observation and media monitoring.

The SIR/CAR representatives were assisted in their activities by the following graduate students: Bruce and Donna Young, applied physiological assessment; Pierre Gervais, biomechanics and photographic analysis; Greg Reeds, social psychology; Brian Walters, organization and administration. Colin Hales and Jan Matte were responsible for documenting the activities of the training camp and the research project on 35 mm slide film and portapak television tape.

Jennifer Pace and John Zarebski were the computer technician and the programmer, respectively, responsible for indepth analysis of the data.

In general, it was agreed by both representatives of the Canadian Federation of Amateur Baseball and SIR/CAR that the project had been very worthwhile both in practical terms in selecting and evaluating the team members and also in scientific terms, integrating the hard sciences with the social sciences. Dick Moriarty reported that the candidates for the team were very cooperative and quite receptive to the tests and measurements project. Paul Taylor indicated that in terms of physiological measurements there was no significant difference between the experimental and control groups, or indeed between the baseball players in both groups and a general population of university students. Wayne Marino indicated that, in terms of biomechanical strength measurement, the experimental group exceeded the control group significantly on six of the nine measures and that there was only a marginal difference in the three remaining measures. In terms of speed and velocity tests, the candidates for the national baseball team compared favourably with professional baseball players at the minor league level and with major league players in some areas. Greg Reeds indicated that there is a high correlation between composite psychological evaluation of the candidates for the team and the objective evaluation provided Coach Bill MacKenzie on their actual performance at the Pan-American Games. When those selected for the team are categorized as excellent, above average, average, below average, and poor on the basis of their performance at the Pan-American Games, they correlate very highly with the categorization predicting their performance as assigned at the training camp on the basis of their various psychological



tests. When one considers that the test predictions preceded by approximately a month the actual performance, the relevance of the testing procedure becomes apparent. Dick Moriarty reported on behalf of Brian Walters that the audio interviews had indicated candidates for the team had high expectations and were well motivated. In general, they were pleased with the policy and procedures of the Canadian Federation of Amateur Baseball and particularly the conducting of the training camp. Increased efforts by the Canadian Federation of Amateur Baseball should be made to inform the candidates as to the selection procedure for the training camp and also the role played by Sport Canada in the mosaic of Canadian amateur athletics.

Reporting the Results, Integrating the Findings  
and Projecting Future Research

A two-part workshop on Saturday, December 15 and Friday, January 18 brought together representatives of the Canadian Federation of Amateur Baseball (Paul Lavigne and Bill MacKenzie) with the SIR/CAR researchers to answer questions listed below:

1. What did we do?
2. What did we find?
3. What does it mean?
4. What further analysis should be done with the data?
5. How should we change the system for next year?

The interactions were recorded on videotape. For the most part they consisted of an indepth report of the results included above along with a dynamic interaction between the professional practitioners and the research project teams with an eye to combining theory and practice. The format for these interactions is listed below:



1. An introduction to the project by Dick Moriarty.
2. Physiological measurements and results by Paul Taylor.
3. Biomechanical measurements and results by Wayne Marino.
4. Psychological measurements and evaluation by Greg Reeds.
5. Organization and administration analysis by Dick Moriarty.
6. Computer analysis by John Zarebski and Jennifer Pace.
7. Interaction and feedback with Bill MacKenzie and Paul Lavigne.

A round table discussion between Bill MacKenzie and the researchers showed high consensus in terms of performance of players and predictions which could have been made from the various tests conducted during the training camp. During the coming training camp it is planned that the tests will be processed more rapidly and time will be set aside for the researchers and managers and coaches to meet daily to interact on the results. In addition, additional meetings will be held between the researchers, management and the players in an effort to develop skill based on the analysis of the research results.

John Zarebski and Jennifer Pace have succeeded in committing all of the research data to computer and have run frequencies to date. Computer analysis will proceed to provide correlation between various measurements as well as cross tabulation analysis comparing the experimental and control groups, those who were selected with those not selected, comparison of first-year selected players with those who have been previously involved in international competition, as well as additional analysis based on early results. The players who did participate in the Pan-American Games have been classified as excellent, above average, average, below average or poor, and on the basis of these categories,

the various test results will be analyzed. Further, it is hoped to compare those who were selected and performed well with those who were selected and did not perform well. Additionally, those who were not selected will be contrasted with those who were selected to see how their test results compare. In any such research project the most desired group are those who were selected and performed well. The next most desirable grouping are those who were not selected and could be predicted would not perform well. It, needless to say, would be undesirable to not select those who would be predicted to perform well, and it was also undesirable to select players who did not perform well. On the basis of the test data collected during the past year compared with the actual performance at the Pan-American Games, it is hoped that in the future a more valid, reliable and objective decision in terms of selection or non-selection and also predicted and actual performance can be achieved. Ultimately, the goal is to develop a conceptual and mathematical model involving the most relevant tests in the selection and development of elite national baseball players.

As indicated above, videotaped documentation of the research project and reporting of the results is available through the University of Windsor SIR/CAR.

The results of this study will be disseminated to the coaching community through clinics and to the scientific community through conferences and symposia.

Further inquiries regarding this study can be directed either to Mr. Paul Lavigne, Executive Director of the Canadian Federation of Amateur Baseball, 333 River Road, Vanier, Ontario K1L 8B9 or to Dr. Dick Moriarty, Director of SIR/CAR, Faculty of Human Kinetics, University of Windsor, Windsor, Ontario N9B 3P4. (Area Code 519-253-4232, Ext. 215)

TESTS AND MEASUREMENTS RESEARCH PROJECT FOR THE CANADIAN NATIONAL  
BASEBALL TEAM: COOPERATIVE CHANGE AGENT RESEARCH BY BASEBALL CANADA  
AND SIR/CAR. W. Marino, P. Taylor, G. Reeds, D. Moriarty, and  
J. Zarebski, University of Windsor

The purpose of the study was to develop a multidisciplinary approach to practical research and to utilize that approach to analyze the characteristics and potentials of the Canadian National Baseball Team. In collaboration with the National Technical Director and team coaches a multidisciplinary research team set up a series of tests designed to provide useful information to the national team coaches and players. The coaches and twenty-five players were assessed during a two-week training camp held in Windsor, Ontario, Canada prior to the 1979 Pan American Games. The main thrust of the project involved Physiological, Biomechanical, Administrative and Social-Psychological investigations. More specifically, measurements were made of physiological capacity and predicted potential, biomechanical characteristics of 'on field' performance, social-psychological aspects of individual traits, situation and behavior, and overall analysis of organization and administration effectiveness and efficiency. All results were compiled and disseminated to the participants as quickly as possible. Physiological estimation of  $\dot{V}O_2$  maximum, body composition and percentage body fat showed no significant difference between the experimental and control groups. Indeed, candidates for the National Baseball Team were significantly lower than other athletes of international calibre and on a par with the average non-trained university student. On the other hand, biomechanical analysis of static strength and bioscientific filming and quantification of various performance parameters such as bat velocity, running speed and reaction time showed that the experimental group was significantly better than the control group. The candidates for the National Baseball Team compared favourably with professional athletes at the minor league level, and in some instances with average performers at the major league level. Social-psychological results of the personality research form, state and trait anxiety, and imbedded figures tests showed high correlation between composite test scores and actual performance of players selected and participating in the Pan American Games. In depth audio interviews on the organization and administration of the Canadian Federation of Amateur Baseball and national team showed the players with high expectations and motivation, but expressing some concern regarding the pre-camp selection process and completely oblivious to the role and function of the Canadian Fitness and Amateur Sport Branch. Subsequent to the initial analyses a study of subdisciplinary interactions was undertaken. On the basis of computer analysis conceptual and mathematical models for selecting, training and evaluating candidates and participants for the Canadian National Baseball Team are being developed. This initial project proved to be beneficial to both practitioners and researchers in assessing elite talent and in developing policy and procedure for multidisciplinary field research. It was concluded by the investigators that this type of research can be a valuable facilitator in the selection, management and training of elite athletes. This study will be continued on a longitudinal basis over the next five years.

This study was funded by the Canadian Federation of Amateur Baseball, "Baseball Canada" through the Canadian Fitness and Amateur Sport Branch.